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CENTER

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INTERNATIONAL TSUNAMI INFORMATION CENTER

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Dr. George Pararas-Carayannis
Director

TSUNAMI NEWSLETTER is published by the International Tsunami Information Center to bring news and information to scientists, engineers, educators, community protection agencies and governments throughout the world.

We welcome contributions from our readers.

The International Tsunami Information Center is maintained by the U.S. National Oceanic and Atmospheric Administration for the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization. The Center's mission is to mitigate the effects of tsunamis throughout the Pacific.

MEMBER STATES

Present membership of the International Coordination Group for the Tsunami Warning System in the Pacific comprises of the following States:

CANADA
CHILE
CHINA
COLOMBIA
COOK ISLANDS
ECUADOR
FIJI
FRANCE
GUATEMALA
INDONESIA
JAPAN
KOREA (REPUBLIC OF)
MEXICO
NEW ZEALAND
PERU
PHILIPPINES
SINGAPORE
THAILAND
UNITED KINGDOM (HONG KONG)
USA
USSR
WESTERN SAMOA

NEWS EVENTS

Tsunami in Western Samoa

A major earthquake, registering 7.4 on the Richter scale, occurred on September 1, 1981 at 0930 (UTC) in the Samoan Islands. The shock was centered at the north end of the Tonga Trench about 200 km west of Pago Pago. A local tsunami that measured 24 cm was recorded in Pago Pago.

At Apia, Western Samoa, the tide gauge located on the northeast coast of Upolu recorded a tsunami of about 21 cm at 0955. However, noticeable damaged was found on the southwest coast of the islands. In the village of Taga, on the south coast of the Island of Savai'i, a dozen cooking fales were swept away along with food, clothing and other household belongings. A fishing boat was carried out to sea and the village water well was badly damaged. Two large guest houses collapsed and the main road of the village was blocked with rocks and logs as a result of the wave. On the Island of Manono, minor damage was also reported. The waves hit a number of houses and swept away some household items. No casualties were reported on either island. Judging from the damage and effects of the tsunami, the wave must have been up to nearly a metre in these parts of the islands.

Earthquake in Mexico

On October 25, 1981 a massive earthquake, centered off the coast of South Mexico, shook Mexico City. The earthquake was measured at 7.2 on the Richter scale. Several buildings were damaged, sending chunks of bricks toppling from tall office buildings and plunging half of the city into darkness. Thousands were trapped in blackness underground as the city's new subway system was halted. A man was killed by a falling power transformer and eleven others were injured fleeing theaters, restaurants and hotels. A total of 3 people were killed and 28 injured.

Tsunami in South Africa (Update)

In our last issue of the Newsletter, we reported that a tsunami occurred in South Africa on May 11, 1981. The cause of the tsunami was concluded to be the earthquake of May 12 at 36.060°S and 48.142°E. Further workup of the record shows that the source of the tsunami is located about 350 km southeast of Cape of Good Hope. Origin time may have been about 0600 local time or 0400 Zulu, May 11, 1981. This helps to illustrate that the event did not originate from the May 12 earthquake. However, the actual cause of the tsunami is still undetermined. A submarine landslide is a possibility. ITIC continues its investigation.

UNESCO - IOC - ITSU

List of National Contacts of ICG/ITSU

The following is a list of National Contacts of ITSU members on file in the ITIC office. Please inform ITIC as soon as possible if there are changes in personnel or address.

CANADA

Chairman ICG for ITSU
Mr. Gerry C. Dohler
Canadian Hydrographic Service
Room 316, 615 Booth St.
Ottawa, Ontario, K1A 0E6
Canada

Mr. Sydney O. Wigen
National Contact for ITSU
Tsunami Adviser
Institute of Ocean Sciences
P.O. Box 6000
9860 W. Saanich Road
Sidney, B.C. V8L 4B2
Canada

CHILE

Captain John Howard
Director
Instituto Hidrografico de la Armada
Casilla 324
Valparaiso, Chile

CHINA

Mr. Shen Zhen-dong
Director
National Bureau of Oceanography
of the People's Republic of China
Beijing, China

COLOMBIA

Capitan J. A. Martinez
Presidente
Comision Colombiana de Oceanografia
Apartado Aereo 28466
Bogota, Colombia

COOK ISLANDS

Commissioner J. Butterworth
Superintendent of Police
Police Headquarters
P.O. Box 101
Rarotonga, Cook Islands

ECUADOR

Capitan de Fragata Pedro Cabezas
Director
Instituto Oceanografico de la Armada
P.O. Box 5940
Guayaquil, Ecuador

FIJI

Mr. Ronald N. Richmond
Director of Mineral Development
Mineral Resources Division
Private Mail Bag G.P.O.
Suva, Fiji

FRANCE	M. Jacques Recy Directeur de la Recherche Office de la Recherche Scientifique et Technique outre-mer B.P. 4 Noumea Cedex (Nouvelle Caledonie)
GUATEMALA	Ing. Jose Vassaux Palomo Jefe del Departamento de Sismologia Division del Observatorio Meteorologico Nacional Ministerio de la Agricultura Palacio Nacional, Guatemala
INDONESIA	Dr. Aprilani Soegiarto Directeur Lembaga Oceanologi Nasional of the Indonesian Institute of Sciences Kompleks Bina Samudera P.O. Box 580 Dak Jakarta, Indonesia
JAPAN	Dr. Norio Yamakawa Head, Seismological Divison Japan Meteorological Agency Ote-machi, Chiyoda-ku Tokyo, Japan 100
KOREA (REPUBLIC OF)	Mr. Myong Bok An Director of Weather Analysis Central Meteorological Office 1 Songweol-dong, Ching-ku Seoul, 110 Korea
MEXICO	Lic. Ma de los Angeles Lopez Ortega Ministro Consejero Encargado de Negociao A.I. Delegacion Permanente de Mexico MAISON DE L'UNESCO Mexico
NEW ZEALAND	Mr. Norman M. Ridgway Dept. of Scientific & Industrial Research New Zealand Oceanographic Institute P.O. Box 12-346 Wellington North, New Zealand
PERU	Capitan de Corbeta Sevilla Aspillaga Casilla Postal 80 Direccion de Hidrografia y Navegacion de la Marina La Punta, Callao, Peru

PHILIPPINES	Chief National Geophysical & Astronomical Service PAGASA 1424 Quezon Boulevard Extension Quezon City, Philippines
SINGAPORE	Dr. K. Rajendram Director Meteorological Service of Singapore 3rd Floor 15 Grange Road Singapore 9, Republic of Singapore
THAILAND	Commander Thanom Charoenlaph Hydrographic Department Royal Thai Navy Bangkok 6, Thailand
UNITED KINGDOM (HONG KONG)	Mr. G. J. Bell Director Royal Observatory Nathan Road Kowloon, Hong Kong
USA	Mr. Mark G. Spaeth U.S. Department of Commerce National Oceanic & Atmospheric Administration National Weather Service Oceanographic Services Branch W161 Silver Spring, Maryland 20910 U.S.A.
USSR	Mr. P. Agafonov Oceanographic Committee of the Soviet Union Gorky Street 11 Moscow 103009, USSR
WESTERN SAMOA	Mr. Christopher Hewson Superintendent Apia Observatory Private Bag Apia, Western Samoa

VIII Session of ICG/ITSU, 13-17 April 1982, Suva, Fiji

The Eighth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG-ITSU VIII) will take place in Suva, Fiji, from 13 to 17 April 1982.

The conference will be held at the South Pacific Bureau for Economic Co-operation (SPEC) headquarters in Suva.

Provisional Agenda

1. *Opening of the Session*

2. *Administrative arrangements for the Session*

   2.1 Adoption of the Agenda
   2.2 Election of Rapporteur
   2.3 Conduct of the Session, timetable, and documentation

3. *Intersessional Activities*

   3.1 Report of the Chairman of the Group and of the IOC Secretary
   3.2 Report of the Director of ITIC
   3.3 National Reports

4. *Future Activities*

   4.1 Consideration of recommendations from the IUGG Tsunami Commission Meeting, held in Sendai-Ofunato-Kumaishi, Japan, 25-26 March 1981
   4.2 Establishment of Regional Warning Centres to improve the Tsunami Warning System in the Pacific
   4.3 Preparation of additional or new travel time charts
   4.4 Improvement of information, compiling and exchange scheme

5. *Proposals to enhance training and education of tsunami specialists of developing Member States of the region and regional co-operation*

   5.1 Organization of workshops on the technical aspects of tsunami analysis, prediction and communications
   5.2 Visiting scientist program
   5.3 UNDP Tsunami projects and basis for formulation of such proposals

6. *Proposals for Draft Program and for Short Term and Medium-Term Budgets*

7. *Other Business*

8. *Date and place of next session*

9. *Adoption of the Summary Report and Recommendations*

10. *Closure of the Session*

INTERNATIONAL TSUNAMI INFORMATION CENTER

Tsunami Bibliography

A comprehensive annotated tsunami bibliography has been recently completed by ITIC. Since the last tsunami bibliography was published under the auspices of IUGG in 1964, the literature in the field has increased greatly. The International Tsunami Information Center (ITIC), with support from the U.S. Nuclear Regulatory Commission (NRC) and from the National Weather Service compiled initially in handwritten index card form the most comprehensive tsunami bibliography known to exist. This annotated bibliography contains approximately 3,000 citations of all English and foreign languages of tsunami related papers published between 1962 and 1976. An additional effort was made by ITIC to update this listing. Since the modest funding provided for the project was exhausted during the data collection phase, ITIC turned over to NRC the card bibliography requesting assistance in organizing this bibliography into an appropriate format compatible with computer and word processing equipment. NRC assigned this task to its division of Technical Information and Document Control (TIDC), but recently the U.S. Regulatory Commission asked ITIC to complete the final review and editing of the tsunami bibliography. This updated annotated tsunami bibliography has been completed, and sent to NRC for computerization and publication.

Visitors to ITIC

Recent visitors to ITIC included among others the following:

Mr. Wally Miyazono	Pacific Mailing Service
Ms. Wilda (Nona) Mazey	Pacific Tsunami Warning Center
Mr. William Adams	University of Hawaii
Mr. W. J. Rapatz	Institute of Ocean Sciences, Canada
Mr. R. H. Ross	U.S. Coast Guard
General William R. Wendt	University of Hawaii
Ms. Lela Karayanni	Athens, Greece
Mr. M. J. Berenzweig	Hawaii State Civil Defense
Mr. James F. Lander	NOAA/EDIS, World Data Center A, Colorado
Mr. Ken K. Yanamura	Hawaii State Civil Defense
Mr. Harry W. Gill	Hawaii State Civil Defense
Mr. Jeff Weston	Butler, New Jersey
Ms. Kay Frances Dolan	U.S. Office of Personnel Management, Honolulu
Sgt. Alan Mitchell	1st Weather Wing, Hickam AFB
Mr. & Mrs. Bob Schank	Honolulu

NATIONAL AND AREA REPORTS

New U.S. Ocean Services Program Coordinator in Hawaii

LTJG Marianne Molchan filled the position of Ocean Services Program Coordinator on January 7,1982, replacing Paul Daugherty. Molchan holds a Bachelor degree in Mathematics and has been a NOAA Corps officer for 5 1/2 years. Prior to joining the National Weather Service, she has served 2 1/2 years aboard a 221 foot hydrographic vessel and 3 years with the Pacific Tide Party (PTC). Her duties at FTC included maintaining the 60 National Ocean Survey's tide gauges in California, Oregon, Washington, Alaska and the Pacific Islands, as well as calibrating the tsunami transmitters and receivers in these locations.

Tsunami Station Inspection

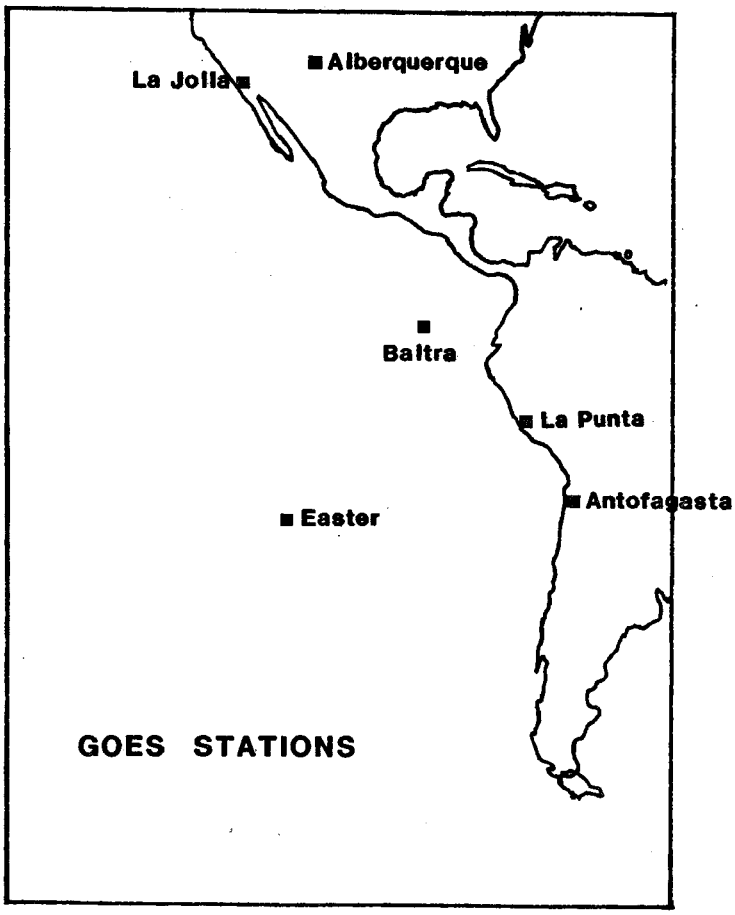
The Pacific Tide Party personnel completed the annual inspection the following stations:

Pago Pago	June 15
Yakutat, Alaska	July 2-4
Kodiak, Alaska	July 18-21
Sitka, Alaska	July 31
Adak, Alaska	August 7-10
Seward, Alaska	August 11-12
Sandpoint, Alaska	August 14-17
Unalaska, Alaska	August 18-19

The Tide/Tsunami Station in Wake Island was completely destroyed by Typhoon Freda in March 1981. Though all the equipment originally installed has been recovered, it is all highly corroded and nonrepairable. The Pacific Tide Party installed a temporary Metercraft gas-purge analog recorder to provide tidal and tsunami information until a new station can be constructed. It is anticipated that a new tide house will be completed by February 1982. By then, the Pacific Tide Party will be installing another ADR tide gauge along with a backup metercraft recorder.

GOES Tsunami Platforms

After approximately four years of operating a prototype GOES tide platform at La Jolla and a prototype GOES seismic platform at Albuquerque, the Tsunami Warning System installed four GOES tide platforms during the period of January to March, 1981. These stations are at Antofagasta and Easter Island of Chile, at La Punta of Peru, and at Baltra Island of Ecuador.



Personnel Changes in the Hawaii State Civil Defense

Maj. General Valentine Siefermann, Director; and Mr. Marvin Berenzweig, Vice Director, both retired at the end of December 1981, from the State of Hawaii Civil Defense.

New personnel in the system are as follows:

Director	Maj. Gen. Arthur U. Ishimoto
Vice Director	Jim Corey
Plans & Operation Officer	Thomas O. Betey

Intelligence, Education & Information Officer	Kenneth K. Yanamura
Civil Defense Planner	James T. Brown
Disaster Assistant Planner	Robert R. Basham
Civil Defense Planner (Radiological)	Richard Kawakami
Civil Defense Earthquake Planner	Norm Lamb
Civil Defense Hurricane Planner	Kimo Kennedy
Civil Defense Training Specialist	Glenn T. Soma

ANNOUNCEMENTS

IUGG General Assembly Scheduled to be held in Germany

The XVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG) will be held from 15 to 27 August 1983, in Hamburg, the Federal Republic of Germany. The meetings and symposia at the General Assembly will include: plenary and administrative meetings of the Union, lectures, inter-disciplinary symposia, exhibition, and scientific excursions in various parts of the Federal Republic of Germany, concentrating on the scientific fields covered by the Union. For more information, contact:

Local Organising Committee
IUGG 1983
Hamburg Messe
und Congress GmbH
- Congress Organisation -
Postfach 302360
2000 Hamburg 36

EMERGENCY 82 Meeting

EMERGENCY 82, an international exhibition of equipment, supplies and services relating to disaster prevention, control and relief is to be held in Geneva from October 20 to 24, 1982. The exhibition is designed to cover all aspects of the operations of national and international services concerned with civil protection in situations of emergency and disaster.

A three-day conference on disaster preparedness, control, and relief sponsored by the International Civil Defense Organization (ICDO) will also be held from October 20 to 22 during the course of the exhibition. For further information, write directly to:

ICDO Conference Secretariat
10-12 Chemin de Surville
CH 1213 Petit-Lancy
Geneva, Switzerland

Seismograms from the People's Republic of China (PRC)

The National Geophysical and Solar-Terrestrial Data Center (NGSDC) of National Oceanic and Atmospheric Administration (NOAA) installed a 70-mm panoramic camera at the PRC's State Seismological Bureau during the latter part of 1980. This initiates the exchange of microfilm copies of seismograms to United States from that country. Seismograms of 1980 and 1981 of the 17-station national network (see Fig. 1) are now available. Other years will become available at a later time. For further information, please contact:

Dale Glover
National Oceanic and Atmospheric Administration
EDIS/NGSDC D62
325 Broadway
Boulder, CO 80303
U.S.A.

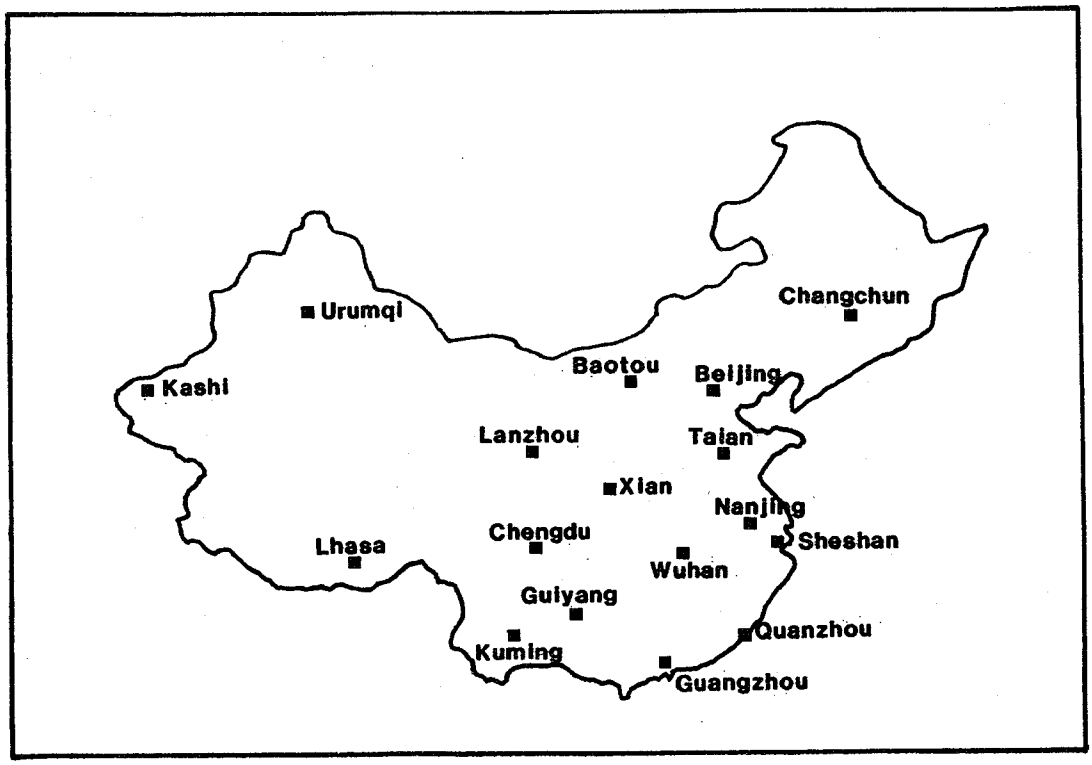


Figure 1. Standard Seismograph Network, People's Republic of China

Proceedings of First Indian Conference in Ocean Engineering

The proceedings include two volumes. Volume one has 83 papers by experts in the respective field. Volume two includes special lectures delivered at the Conference. The papers, grouped into eight main themes, cover a wide spectrum of Ocean Engineering activity: off-shore structure, energy, instrumentation, pollution and others. Copies may be ordered from:

K P Bagchi & Company
286 B B Ganguly Street
Calcutta 700012
India

Societal Response Research Program

The Earthquake Hazards Mitigation Program, in the National Science Foundation's Division of Problem-Focused Research, has announced the availability of funds under a new program, "Research on Societal Response to Earthquakes and other Natural Hazards and Disasters." The objectives are as follows:

- To develop knowledge about social and economic aspects of hazard mitigations.
- To increase the base of knowledge about preparedness for earthquakes and other hazards.
- To improve understanding of disaster impacts on economic and social systems.
- To provide a basis for improving dissemination of information on hazards, and for enhancing its usefulness to decision makers and the general public.

To obtain the complete announcement, contact:

William Anderson
Program Manager
Division of Problem-Focused Research
National Science Foundation
1800 G. Street, N.W.
Washington, D.C. 20550
U.S.A.

Emergency Management: A Mayor's Manual

The above is a publication of the findings from a two-year investigation of all aspects of emergency management by the United States Conference of Mayors. The manual addresses three major areas:

1. Pre-disaster emergency functions

2. Emergency operations

3. Post disaster recovery

For a copy of this manual, please write to:

The Emergency Preparedness Project
U.S. Conference of Mayors
1620 Eye Street, N.W.
Washington, D.C. 20006
U.S.A.

Coastal Engineering Design, 18-20 May 1982

This is a short course intended to help engineers in designing, constructing, and maintaining structures subject to waves, currents, and floods near the coast. The course considers three major interrelated questions:

1. What are the forces exerted by ocean waves and currents on structures immersed in the sea, such as outfalls, pipelines, platforms, floating breakwaters, and coastal residences subject to flooding?

2. How do you predict sediment transport by waves and currents in coastal waters to improve dredging effectiveness, control shore erosion, and maintain beaches and dunes?

3. How do you select the best structure to stabilize shorelines and waterways in a given location? Revetments, jetties, groins, seawalls, coastal vegetation and others are considered.

The cost of the course is $350, if received by 7 May 1982, and $375 by 18 May 1982.

For more information, please contact:

James R. Hill
Short Course Coordinator
Box 623
Springfield, Virginia 22150
U.S.A.
(703) 569-9187

CODATA Directory of Data Sources for Science and Technology, Chapter 5 - Seismology

The above mentioned Directory Chapter edited by James F. Lander and published as CODATA Bulletin 43, is now available from Pergamon Press

for $10. Those who are interested in receiving further Directory Chapters on other scientific and technological areas may want to take out a subscription to the CODATA Bulletin at $25 per year. Send request to:

Pergamon Press Inc.
Maxwell House
Fairview Park
Elmsford, N.Y. 10523
U.S.A.

OR

Pergamon Press Ltd.
Headington Hill Hall
Oxford OX3 OBW
ENGLAND

International Conference on the Physics and Mitigation of Natural Hazards, 15-21 August 1982

HAWAII CALLS for papers on "Physics and Mitigation of Natural Hazards," such as earthquakes, hurricanes, volcanoes, landslides, and tsunamis. The International Conference on the Physics and Mitigation of Natural Hazards will be held in Honolulu, Hawaii, from 15 to 21 August, 1982 under the sponsorship of Hawaii Institute of Geophysics (University of Hawaii), The Tsunami Society, the International Tsunami Information Center, the Pacific Tsunami Warning Center, and the Joint Institute for Marine and Atmospheric Research (and possibly the East-West Center).

This announcement is to invite you to submit an abstract of about 250 words for a paper to be considered for presentation at this International Conference. Mail before 15 May 1982 to:

Prof. W. M. Adams
University of Hawaii
2525 Correa Road
Honolulu, Hawaii 96822
U.S.A.

ABSTRACTS AND RESUMES

Post-Tsunami Disaster Survey

S.O. Wigen and M.M. Ward
Canadian Hydrographic Service
Pacific Region
Sidney, British Columbia

[Lighthouse (Journal of the Canadian Hydrographers' Association), Special Edition, Proceedings of the 20th Annual Canadian Hydrographic Conference, April 1981, pp. 50-61]

Abstract

Canadian coasts may at any time experience destructive sea waves from a local or distant tsunami. Hydrographers, with their knowledge of surveying tidal reference levels and photogrammetry, and with their intimate awareness of the coasts and coastal populations, are uniquely qualified to conduct post-tsunami surveys.

Tsunamis occur with sufficient frequency on Canadian coasts that their threat has to be anticipated in designing bulk cargo facilities, oil superports, liquid natural gas terminals, and atomic power plants using saltwater cooling. Yet, because of the limited systematic knowledge of past occurrences, the design of tsunami protection is being based on hypothetical events. It is important that for each new major tsunami, systematic observations be made over affected coastal areas. Procedures for such surveys are outlined, and the needs of scientists for specific information are reviewed.

Designing, Building and Maintaining the Langara Point Tsunami Warning Station 1968-1980

R.E. Brown
Institute of Ocean Sciences
Sidney, B.C.

[Pacific Marine Science Report 81-5]

Abstract

A tide gauge station was established at Langara Point on Langara Island near the lighthouse on the 22nd of April, 1969. It was incorporated into the Pacific Tsunami Warning System as an active participant on 26 October 1973 after much experimentation with instrumentation before suitable components were found that would meet the requirements and would survive the rigors of the North Coast.

It is hoped that the addition to the network of this strategically located station will help to prevent loss of life and property in the future.

Tsunami Investigation for the New Zealand Coast

W.P. de Lange and T.R. Healy
Earth Sciences
Waikato University

(Paper presented to the New Zealand Marine Sciences Society Conference)

Abstract

In the past New Zealand has been subjected to a number of tsunamis.

Two distinct groups have been recognized; locally derived tsunamis from sources within New Zealand's continental margins, and transoceanic or distant tsunamis from sources beyond New Zealand's continental margins.

Transoceanic tsunamis capable of reaching New Zealand's margins with an appreciable magnitude can be attributed to one source mechanism; a large, shallow-focus earthquake involving a permanent sea-floor displacement. Local tsunamis in the historical record can also be attributed to this source mechanism. Two further possible geological source mechanisms exist, viz., volcanic activity, especially phreatic eruptions, and large coastal or submarine landslides.

The investigation will consider the effects on the New Zealand coast by tsunamis generated by three types of source:

i) A distant source,
ii) a local point source, and
iii) a local elliptical source.

The local sources are more likely to occur in regions of known seismic and volcanic activity. Therefore, the investigation will concentrate on coastal areas where large active faults cross the coast, or where volcanic activity has occurred recently, geologically speaking.

Initial wave refraction results indicate that tsunamis from a distant source are not likely to cause any significant damage in those coastal regions which are protected by an appreciable shallow continental shelf. This is due to the absorption of the wave energy by a number of processes as the wave crosses the continental slope and shelf.

Investigation of Rayleigh Wave Spectra for a Set of Strong Pacific Earthquakes

V.K. Gusiakov
Computing Center
Novosibirsk, USSR

[To be published in the Proceedings of the International Tsunami Symposium held in May, 1981 in Sendai, Japan]

Abstract

The present tsunami warning system is based almost entirely on seismic magnitude criteria. Accordingly, earthquakes are regarded as able to generate destructive tsunamis when their magnitude exceeds some threshold value. If the threshold magnitude is set correctly, this method does not give missings of potentially dangerous tsunamis, but produces a high percentage of false alarms.

The results of many recent theoretical and experimental investigations show that the probability of tsunami generation depends not only on magnitude, but on other parameters of an earthquake; such as depth and mechanism of a source, and the rupture velocity and the rise time of source deformation. Therefore these parameters must be taken into account for the improvement of tsunami warning system. However, the elaboration of sufficiently reliable, precise and operational methods for the determination of the above parameters from observations at one or few stations still presents many problems. Under existing conditions, a number of attempts were undertaken to detect some phenomenological signs of tsunamigenity on records of submarine earthquakes. For that purpose, mainly the initial part of seismograms between arrivals of P and S waves was examined.

The present study was carried out with the purpose of evaluation of prognostic possibilities of Rayleigh waves on the basis of the investigation of their spectral characteristics for the set of strong underwater Pacific earthquakes. Seventeen events with magnitudes around 7.0 occurred mainly in northwest part of Pacific considered. Nine of them were tsunamigenic, i.e. they generated detectable tsunamis with different intensity. The long period seismograms of these earthquakes recorded at the WWSS stations located around the Pacific were used as the source data. The parts of seismograms corresponding to Rayleigh waves were digitized with equispaced samples equal to one second. The amplitude spectra of digitized series obtained were calculated by using discrete Fourier transform, and spectral-time diagrams were obtained by the so-called multiply filter technique. The investigation of stability and significance of the computed spectra under the used value of sampling, the length of digitized intervals and the position of the zero level on records was carried out.

It was shown that there are distinct differences in the form of amplitude spectra of Rayleigh waves for two groups of earthquakes. The main maximum of spectra for the tsunamigenic earthquakes is much wider than for those nontsunamigenic and its position is shifted to the low-frequency domain. The level of spectral amplitudes within the band of periods from 50 to 150 sec for the first group of the earthquakes is about two times higher than for the earthquakes of the second group. Studying the spectra-time diagrams also showed that there are differences in their structure between both groups of earthquakes.

Thus, the results of this study show that the use of some spectral characteristics of Rayleigh waves allows one to recognize tsunamigenic earthquakes. Therefore they can be employed for the improvement of tsunami warning system provided that the digital processing of seismograms is available at routine service.

Tsunami Waves Climbing a Beach Without Breaking

R.Kh. Mazova and E.N. Pelinovsky
Institute of Applied Physics
of the Academy of Sciences, USSR
Uljanov Street 46, 603600 Gorky
USSR

Due to the length and technical nature of the abstract, it is not included in the Newsletter. However, those who are interested may request from ITIC directly. It is anticipated that this article may be published in the Journal of the Tsunami Society.

Field Survey of the Tsunamis Inundating Owase City -- The 1944 Tonankai, 1960 Chile, and 1854 Ansei Tsunamis

Tokutaro Hatori, Isamu Aida, Sin'iti Iwasaki and Toshiyuki Hibiya
Earthquake Research Institute
Japan

[Bulletin of the Earthquake Research Institute, Vol. 56 (1981) pp. 245-263] In Japanese

Abstract

Owase located on the east side of Kii Peninsula has been hit by many tsunamis. Sources of most tsunamis were off Tokaido along the Nankai Trough. The 1960 Chile tsunami that propagated across the Pacific Ocean also hit Owase City. There remain even now traces of the inundated level on many houses in Owase caused by the 1944 Tonankai and 1960 Chile tsunamis. Based on these traces, the inundation heights of the two tsunamis run-up on land were surveyed, using the automatic level from Nov. 4 to 7, 1980. The relation between the geographical distribution of the inundation heights and the damage to houses was investigated. The results of the present surveys are as follows:

1) The inundation heights of the 1944 Tonankai tsunami at the harbor were 5.0-5.5 m above M.S.L. Ground about 3.0 m above M.S.L. was inundated. The inundated area stretched along the Kita River. The water level decreased in height as it moved inland. The topography of the ground controls the damage to houses. Fifty percent of the ordinary Japanese wooden type houses were damaged when the water reached 1.5 m above the ground. From the inclination of the water surface along the Kita River, the mean water velocity is calculated as 3.5 m/sec.

2) The inundation heights of the 1960 Chile tsunami at the harbor were 3.0-3.5 m above M.S.L. Although the water reached 1.0-1.5 m above the ground, hardly any houses were washed away. The traces of the inundated level into land are nearly flat, suggesting that the velocity of the incident flow was small.

3) Based on old documents, the inundation height of the Ansei Tokai tsunami (Dec. 23, 1854) is estimated as 6.5 M above M.S.L. The height is 0.7-1 m higher than that of the 1944 Tonankai tsunami. Ground above 4 m high was inundated.

An Investigation of Tsunami Generated by the Izu-Hanto-Toho-Oki Earthquake of 1980

Tokutaro Hatori
Earthquake Research Institute
Japan

[Bulletin of the Earthquake Research Institute, Vol. 55 (1980), pp. 1073-1081] In Japanese

Abstract

Very small tsunami was generated by the main shock (M=6.7) in an earthquake swarm off Ito, the east side of Izu Peninsula, on June 29, 1980. The maximum double amplitude of 56 cm for a period of 3.5 min was observed at Okada, Izu-Oshima Island, while those at other tide stations in Sagami Bay were about 10 cm. Tsunami magnitude of the Imamura-Iida scale is m=-1.5. The source area of tsunami inferred from the inverse refraction diagrams agrees well with the earthquake swarm. The source area extends 17 km in the N20°W direction. Judging from the initial motion of tsunami on the records, an uplift of several centimeters may have occurred at the sea-bottom of the source area. The present tsunami had both a small wave-height and source dimension, just like other Izu tsunamis in 1974 and 1978.

Tsunami Magnitude and Source Area of the Aleutian-Alaska Tsunamis

Tokutaro Hatori
Earthquake Research Institute
(Received January 24, 1981)

[Bulletin of the Earthquake Research Institute, Vol. 56 (1981), pp. 97-110] In English

Abstract

Based on tide-gauge records of the USCGS and Japanese data, the magnitude and source area of the Aleutian-Alaska tsunamis during the past 42 years are investigated. According to the author's method based on the attenuation of wave-height with distance, the tsunami magnitude (Imamura-Iida scale) of the 1946 Aleutian and 1964 Alaska tsunamis are estimated to be m=3 and 4 respectively. The magnitudes of the 1957 and 1965 Aleutian tsunamis are m=3. According to the empirical formula,

the tsunami magnitude is well correlated with seismic moment, but the seismic moment for the 1946 earthquake is considerably small. Its seismic moment may be 1.5 x 10^{29} dyne-cm judging from the tsunami magnitude.

The source area of the 1946 Aleutian tsunami which inferred from an inverse refraction diagram is especially different from the aftershock area. The source area lies on the steep continental slope extending about 400 km between the Unalaska and Unimak Islands. The source area of the 1957 Aleutian tsunami is the largest. The length of tsunami source is 900 km which agrees with the aftershock area. The western part of the source area overlaps about 200 km of the source area of the 1965 tsunami. In the geographic distribution of the tsunami source in the Aleutian-Alaska region, a remarkable gap of the tsunami source is found between the Unimak and Shumagin Islands. This significant segment of 300-400 km may be considered a region of relatively high tsunami risk having the magnitude m=2-3.

Field Investigation of the Nankaido Tsunamis in 1707 and 1854 along the South-West Coast of Shikoku

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[Bulletin of the Earthquake Research Institute, Vol. 56 (1981), pp. 547-570] In Japanese

Abstract

The west coast of Kii Peninsula and Shikoku, western Japan, suffered severe damage from the three Nankaido tsunamis of 1707, 1854 and 1946. There are many old monuments of the 1854 Ansei tsunami along the Kochi coast. Old documents on the Hoei (Oct. 28, 1707) and Ansei (Dec. 24, 1854) tsunamis along the southwest coast of Kochi Prefecture were collected during the present field investigation and illustrated in this paper. Based on the documents, the inundation heights of the 1707 Hoei and 1854 Ansei tsunamis were surveyed by handlevel and compared with those of the 1946 Nankaido tsunami (Dec. 21, 1946).

The inundation heights (above M.S.L.) of the 1854 Ansei tsunami along the southwest coast of Kochi averaged 5.5 meters. Those of the 1707 Hoei tsunami averaged 7.7 meters with maximums of 10 meters at places. Although the inundation heights of the 1946 tsunami along the entire Pacific side of Shikoku were nearly uniform, the patterns of height distribution along the west coast of Shikoku for the 1707 and 1854 tsunamis differ significantly from those of the 1946 tsunami. The inundation heights of the 1854 Ansei and 1707 Hoei tsunamis on the western Shikoku coast were 1.5 and 2.1 times, respectively, higher than those of the 1946 tsunami. This suggests that the rise times and/or the amount of the slip displacements on the west part of the fault might be different.

Colombia-Peru Tsunamis Observed along the Coast of Japan, 1960-1979

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[Bulletin of the Earthquake Research Institute, Vol. 56 (1981), pp. 535-546] In Japanese

Abstract

During the past 20 years (1960-1979), five tsunamis generated off Colombia and Peru were observed by tide gauges in Japan. Based on these tide gauge records, the magnitude and behavior of the Colombia-Peru tsunamis were investigated. According to the PDE (U.S.A.) reports, the earthquake magnitudes of the surface waves were in the range of M_S=7.5 to 7.9. The magnitude of the Colombia earthquake on Dec. 12, 1979 was the largest. The aftershock areas of these earthquakes except for the earthquake on May 31, 1970 lay on the continental slope, parallel to the bathymetric contours. The lengths of the aftershock areas were 120-200 km.

According to the author's method based on the attenuation of tsunami height with distance, the tsunami magnitudes (Imamura-Iida scale: m) of the Colombia-Peru tsunamis were determined to be m=2 to 2.5. Along the coast of Japan the maximum double amplitudes of these tsunamis averaged about 20 cm. The amplitudes in north-eastern Japan were recorded with a localized maximum of about 40 cm. The period of the tsunamis observed at most of the tide stations was 15 min, not as long as that of the 1960 Chile tsunami. The initial wave front of the Colombia tsunami reached north-eastern Japan in 19.5 hours, and then propagated along West Japan 1.5 hours later. The Peru tsunamis took 20 to 21.5 hours. The more southernly the South American tsunami source the longer the tsunami takes to reach Japan.

PACIFIC TSUNAMI WARNING CENTER

Seismic Summary (August 1, 1981 to Press Time)

EVENT NO.	EVENT	LOCATION	ACTION TAKEN
1981-14	Sep 1 0930 (UT)	Samoa 14.6 S	Press Release issued. (Small tsunami recorded in Western Samoa and American Samoa.)
(PTWC)	7.4	172.7 W	

EVENT NO.	EVENT	LOCATION	ACTION TAKEN
1981-15	Sep 3 0536 (UT	Hokkaido, Japan 43.3 N	Press Release
(PTWC)	6.5	147.3 E	
1981-16	Sep 17 0823 (UT)	New Caledonia 22.5 S	Press Release
(PTWC)	6.5	165.5 E	
1981-17	Oct 16 0326 (UT)	Valparaiso, Chile 32.1 S	Press Release
(PTWC)	7.2	72.6 W	
1981-18	Oct 25 0322 (UT)	Acapulco, Mexico 16.7 N	Press Release
(PTWC)	7.2	99.6 W	
1981-19	Nov 6 1648 (UT)	Wewak, Papua New Guinea 3.9 S	Press Release
(PTWC)	6.6	144.3 E	
1981-20	Nov 7 0330 (UT)	Chile, 200 miles east of Santiago	Press Release
(PTWC)	6.6	32.8 S 69.9 W	
1981-21	Nov 24 2331 (UT)	New Caledonia 23.1 S	Press Release
(PTWC)	6.7	170.5 E	
1981-22	Dec 19 1141 (UT)	Northern Aegean Sea 40.1 N	Press Release
(PTWC)	7.2	25.9 E	
1981-23	Dec 26 1705 (UT)	Kermadec Islands 30.5 S	Press Release
(PTWC)	6.7	177.7 W	

EVENT NO.		EVENT	LOCATION	ACTION TAKEN
1982-1		Jan 1 1851 (UT)	Bonin Islands 26.3 N	Press Release
	(PTWC)	6.6	141.9 E	
1982-2		Jan 11 0610 (UT)	Philippine Islands 13.4 N	Press Release
	(PTWC)	6.8	124.3 E	
1982-3		Jan 18 1927 (UT)	Aegean Sea 39.0 N	--
	(PTWC)	7.0	25.2 E	
1982-4		Feb 20 1327 (UT)	Santa Cruz Islands, Solomons 9.9 S	Press Release
	(PTWC)	6.7	165.9 E	

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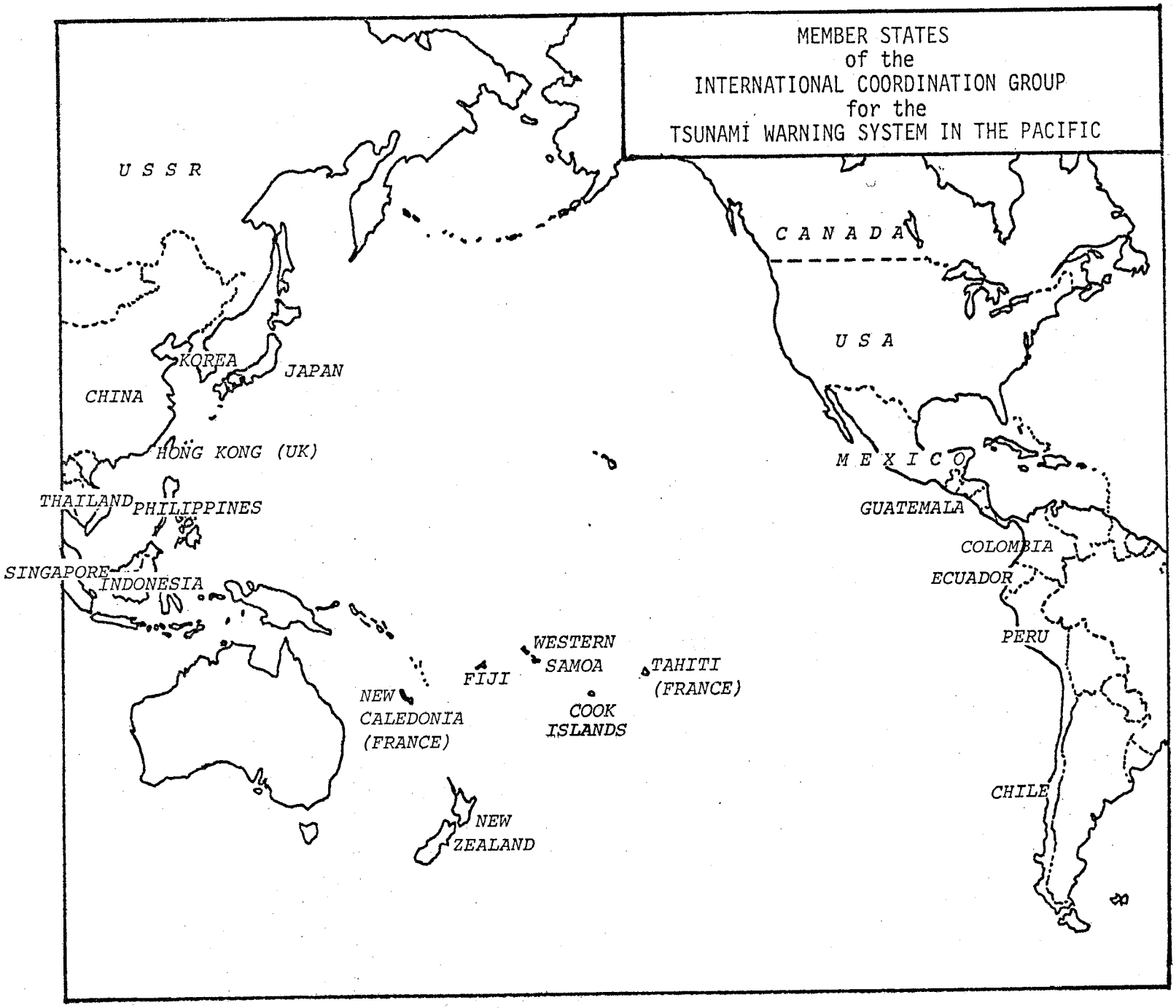
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